XXX.

ON A METHOD FOR COLOURING LANTERN SLIDES FOR SCIENTIFIC DIAGRAMS AND OTHER PURPOSES.

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The method of colouring the gelatine film with the anilin and other dyes is not new; but in the form in which it has been practised hitherto, the dyes have been thickened and used on the surface after the manner of ordinary pigments. In the method which I have adopted, the gelatine is stained simply without the addition of any medium. In order to make the colour run evenly, the gelatine film should be moist, but not wet with drops of water—the most favourable condition being immediately after the final washing of the slide is completed, and the film allowed to drain; but if this should not be convenient, the slide may be placed in water for a quarter of an hour, and then drained. If the slide has been dry for some days or weeks, a greasy film appears on the surface, which should be removed with a little methylated spirit before soaking in water.

In this damp condition the colour will be absorbed slowly and evenly, when a dilute solution of the dye is applied with a brush. The colours show no tendency to run. The intensity of colour depends primarily on the strength of the original solution, and secondly on the length of time it is allowed to act on the gelatine, so that local shading can be produced by keeping the brush in one spot for a longer time. Should the trial be unsatisfactory from any cause, the colour can be completely removed by soaking in clean water for some time, and the slide can be re-painted.

If the colours are placed simply on the gelatine, almost any of the dyes can be used; but some are more likely to fade than others, and a few are more easy to lay on evenly. If, however, the colours have to be mixed, either before painting or by overlapping on the gelatine, it is important to remember that some of the dyes act

chemically on each other, and produce new bodies, which may be granular or of a new colour. Ordinarily, yellow and blue make green: thus, indigo carmine, when mixed with either picric acid, naphthal yellow, or tartrazene yellow will produce various shades of green; but if methylene blue be mixed with the same yellows, a purple colour is produced with picric acid, an orange with naphthal yellow, and a green with tartrazene yellow.

The colours which I have found satisfactory both as to mixtures and ease of laying on evenly are—*eosin*, *tartrazene yellow*, *vesuvin*, *indigo carmine*—with *soluble blue* as a useful alternative for the last for bright green, when mixed with tartrazene yellow. Methylene blue, methyl violet, and iodine green did not appear to be satisfactory colours.

As some of the anilin dyes are liable to fade on exposure to light, I painted a test slide with parallel lines of the colours just mentioned and others, and having covered one half of the plate with black paper, placed it in a lantern illuminated with a Brockie-Pell arc lamp. The light was maintained at intervals, as was found convenient, until a total of five hours had been reached, when it was found that eosin, methyl violet, and iodine green faded most; others slightly, and tartrazene yellow and indigo carmine very little, if at all. Subsequently, a similar plate of eosin, atlas scarlet, and two varieties of erythrosin was illuminated for five hours before the arc-light, in the hope that one of them would prove more permanent than eosin. They were, however, very similar in their permanence.

One sample of erythrosin, obtained from Schuchardt of Görlitz, seemed a trifle better than the other make of erythrosin and the other colours.

It is difficult to find a dye so brilliant as eosin, even erythrosin being much more purple; so I have recommended eosin as one of my selected colours, notwithstanding its defects; it must, therefore, be applied a little more intensely, if the slide is intended for much use. Very faint pinks will fade completely in a few minutes in the lantern, while, on the other hand, I have slides in use for years which have been rather strongly coloured, and show no appreciable amount of fading yet.

Coloured outline diagrams may be made on clear glass by using, with an ordinary pen, solutions of the dyes which have been

thickened with dextrine to give a body to the colour: about 10 per cent. dextrine is sufficient; the glasses should be well cleaned before writing. In a compound diagram, if the first colour be allowed to dry, other colours may be rapidly written over the former ones without risk of removing them. For these inks any colour may be used. Iodine green and eosin inks make a particularly brilliant contrast. A very good dark ink, not absolutely black, may be made from Antoine's "encre noire," made slightly alkaline with ammonia, and thickened with 10 per cent. of dextrine.